

**Draft Stressors for Delta Smelt and Longfin Smelt by Conservation Theme**  
**(Summary from Handout #2)**

**Theme 1. Reduce Sources of Mortality**

**Entrainment at Diversions**

- 1-1 State Water Project (SWP) entrainment
- 1-1b Central Valley Project (CVP) entrainment
- 1-4 DWR owned diversions (e.g., Sherman Is.)
- 1-5 USBR owned diversion
- 1-6 Private diversions (CCWD, agricultural)
- 1-6b Mirant Pittsburg and Contra Costa power plants
- 1-7 North Bay Aqueduct entrainment

**Other Sources of Mortality**

- 1-2 SWP/CVP salvage
- 1-3 Clifton Court predation
- 1-8 Exposure to toxics
- 1-9 Predation
- 1-10 Propeller entrainment
- 1-11 Harvest
- 1-11b Illegal harvest
- 1-12 Insufficient food supplies/location
- 1-13 Disease

**1-14 Monitoring mortality**

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**Theme 2. Increase Species Production (reproduction, growth, survival)**

- 2-1 Insufficient food supplies/location
- 2-2 Reduced suitable spawning habitat
- 2-3 Reduced suitable rearing habitat
- 2-4 Reduced seasonal availability of adult habitat
- 2-5 Sublethal exposure to toxics
- 2-6 Competition
- 2-7 Water quality problems (reduced DO, seasonal salinity gradients, suspended sediments)
- 2-8 Levee construction/island reclamation

**Theme 3. Increase Habitat Quality And Availability**

- 3-1 Reduced sediment input (change in volume, quality, geomorphic processes)
- 3-2 Reclamation/conversion of wetlands
- 3-3 Land use changes (agriculture/urban development)
- 3-4 Reduced seasonal transport flows
- 3-5 Reduced upstream attraction flows
- 3-6 Reduced riparian vegetation

- 3-7 Channelized riprap levees
- 3-8 Expansion of non-native species (Egeria, etc.)
- 3-9 Increased water depth (channel dredging; marinas, ship channels)
- 3-10 Island subsidence (future under failed levee conditions)
- 3-11 Increases in temperature (global warming)
- 3-12 Changes in seasonal hydrology (climate change—diminishing snow pack, shift in rain cycle)
- 3-13 Sea level raise

**Theme 4. Increase Habitat Diversity**

- 4-1 to 4-4 Levees/reclamation
- 4-5 Levees/reclamation/land use changes
- 4-6 Salinity control/compliance
- 4-7 Upstream impoundment storage and instream flow releases
- 4-8 Flood control operations

**Theme 5. Increase Species Resilience**

- 5-1 Reduced genetic integrity and diversity (what is the minimum number of fish and distribution that needs to be maintained to maintain genetic integrity for smelt)
- 5-2 Reduced population abundance
- 5-3 Reduced population geographic distribution
- 5-4 Reduction in independent populations
- 5-5 Increased habitat stability (pops are insulated from historical range of perturbations because of constrained Delta system) If restore historical range of drought-flood, eliminate habitat for exotics that benefit from stability)—have smelt lost ability to adapt to variability???—will other exotics take advantage of restored fluctuating system
- 5-6 Reduced habitat diversity
- 5-7 Reduced frequency of chaotic events

**6. Increase Food Availability (phytoplankton, zooplankton, macroinvertebrates, forage fish, etc)**

- 6-1 Reduced organic/energy input (inflow from upstream and in-delta production)
- 6-2 Increased consumption by non-native species
- 6-3 Increased diversion of nutrients/production out of estuary
- 6-4 Increased competition with non-native species
- 6-5 Increased channel velocities/reduced hydrologic residence time
- 6-6 Increased water depths relative to the photic zone